

Rijkswaterstaat
Ministerie van Verkeer en Waterstaat

Caltrans - V&W/RWS Climate Collaboration

Expert meeting 18 Feb 2010

Paul Fortuin, DVS



Contents

- Climate change in California
- Climate legislation in California
- Caltrans climate activities
- Caltrans - V&W collaboration: focus areas
- Synergy points

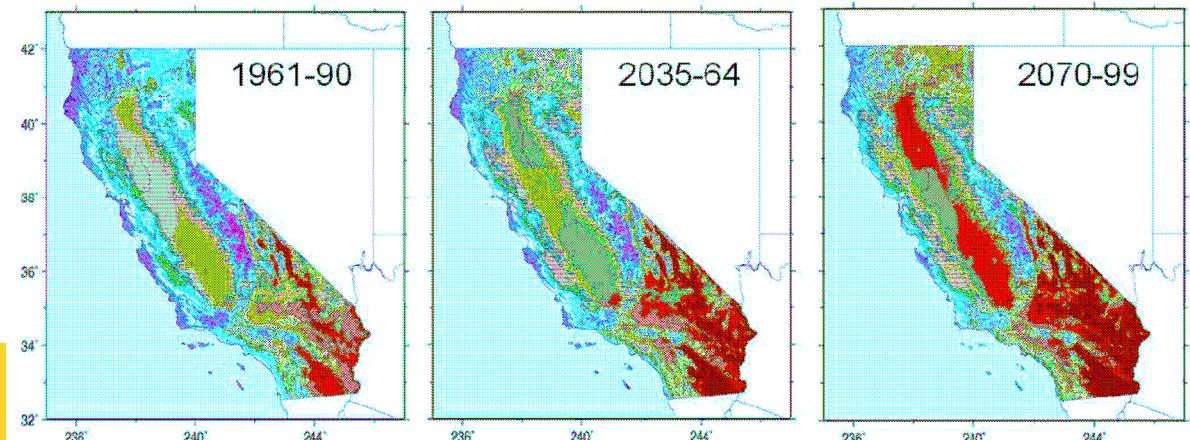


Climate change in California

Report: California 2009 Climate Change Impacts Assessment

- based on 2009 Scenarios Project
 - 6 global climate models
 - conform IPCC 2007
- effects:
 - higher T + extreme events
 - precip changes
 - sea-level rise

	2050	2100
T	1 - 3 °C	2 - 5 °C
Precip	-12 -> -35%	
Sea level	30 - 46 cm	53 - 140 cm



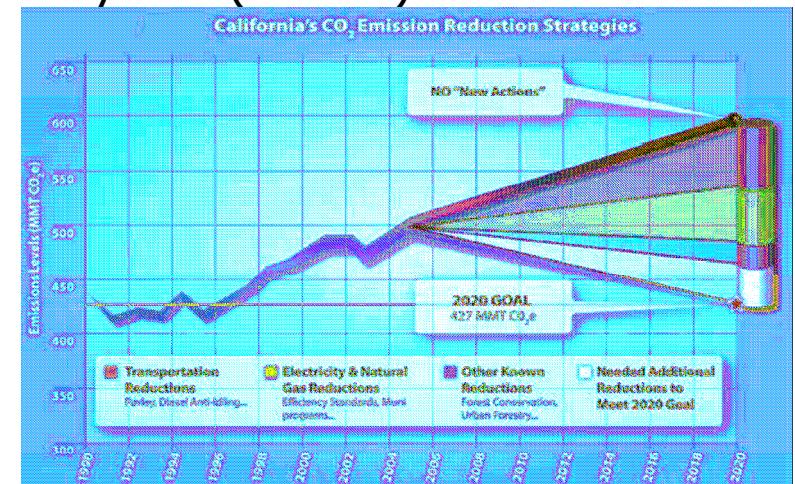


Climate change legislation in California

Mitigation

California: 98% GHG em's from fossil fuels
40% " from transportation

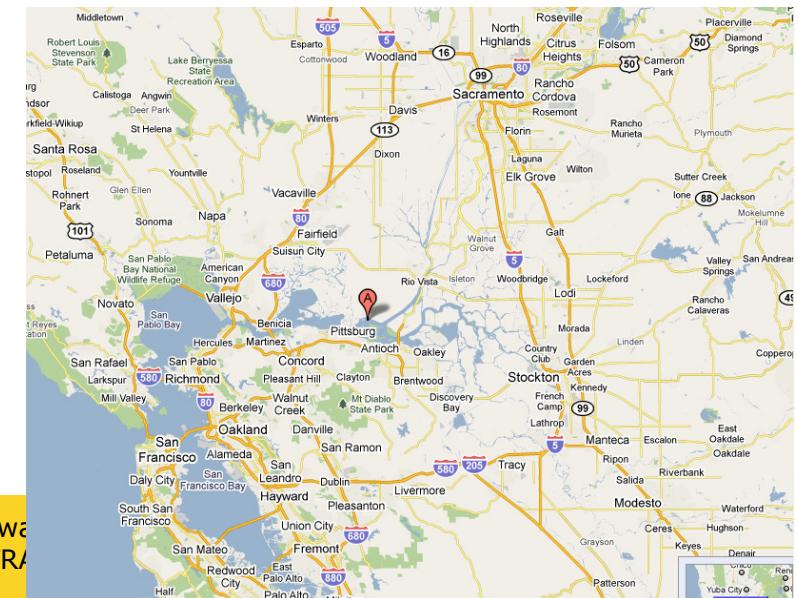
- Assembly Bill (AB 1493)
2002: CARB regulations to reduce car & light truck GHG em's
2007: CA waiver denied by EPA
2009: enacted by Obama adm, 35.5 mpg (12.5 km/l) standard in 2012
- Executive Order (S-3-05) -> 2006 Assembly Bill (AB 32)
CA GHG em's on 2000 level in 2010
" 1990 " 2020
" 20% of 1990 " 2050
- Executive Order S-1-07
low C-fuel standard (-10% by 2020; no federal legislation yet!)





Climate change legislation in California.. Adaptation

- Executive Order S-13-08:
address CA vulnerability to sea-level rise
 - > report: 2009 California climate adaptation strategy
 - > N.Acc.Sc report: Sea level assessment (Dec 2010)
 - CA DoT: assess vulnerability of transportations system
 - Bay-Delta lands (Sacramento - San Joaquin delta levee system)
 - 120.000 ha below sea-level
(+ subsiding)
 - levees_
based on soft peat soils
dual threat: sea + river
- > International Delta Alliance





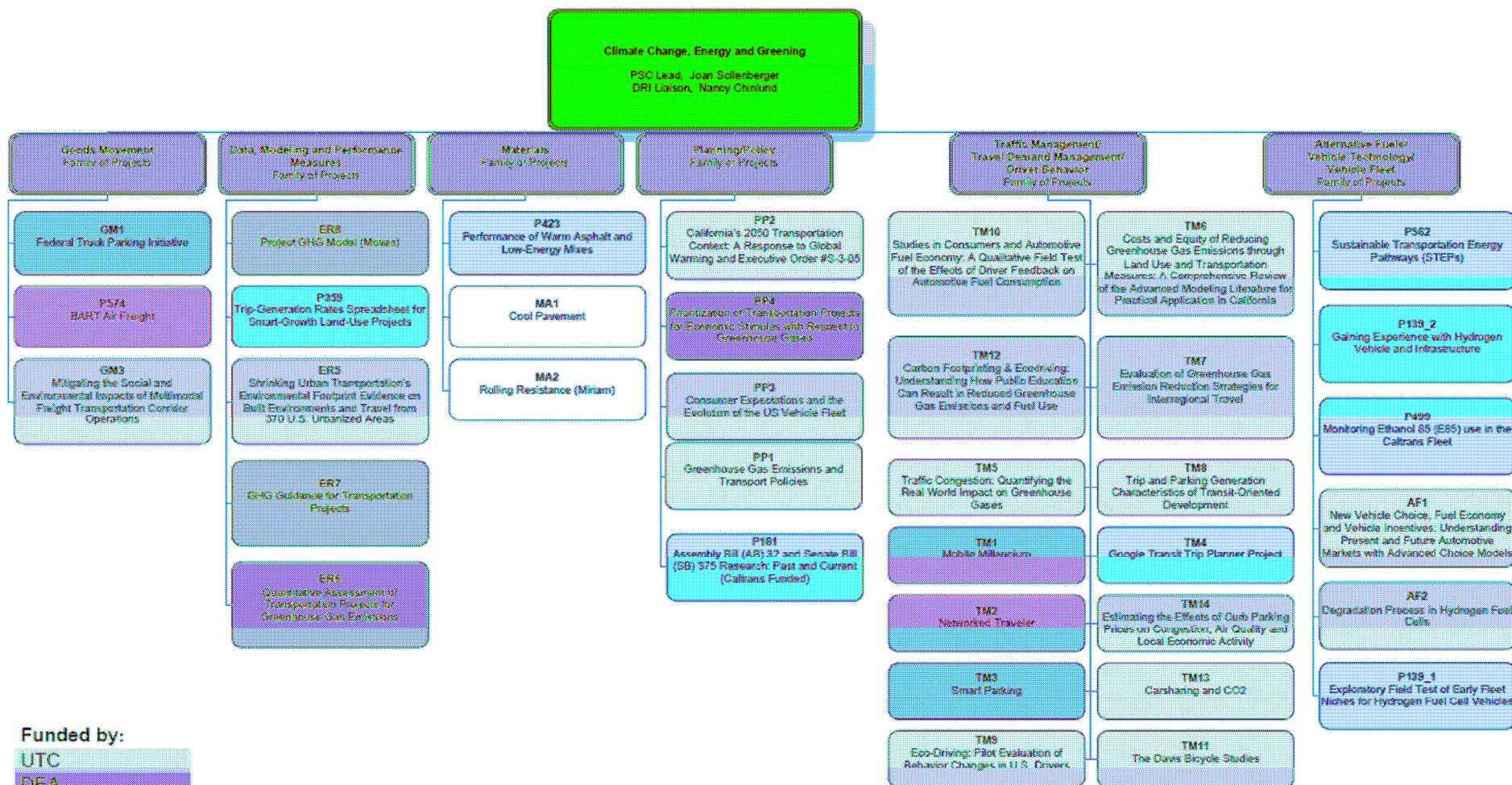
Caltrans & climate change

Climate Action Program at Caltrans:

- support activities/studies on reduction VMT (land use strategies, job-housing, transit oriented,..) energy efficiency in transportation (vehicle fuel economy)
- support legislation on transport mitigation
- support regional services (RD'n), e.g climate change in EIA
- participate in Climate Action Team
 - > join CA DoT Climate Change Research Road map



CA DoT Climate Change Research Road map



Funded by:

UTC
DEA
MULTIPLE
DRI



Caltrans - V&W collaboration

	V&W/RWS	Caltrans
1a. Traffic/mob. Management	DVS/IN: Marko, Paul	Vahid Nowshiravan, Pete Conn
1b. Mitigation policies	DGMo: Monique van Wortel	CARB: Belinda Chen, Bart Croes
2. Design parameters - climate change (superstructure) - flooding (substructure)	DVS/O&I: Jan vd Zwan Henkjan Beukema	Glenn deCLou (drainage), Keith Jones + Karl Dreher (stormwater), Gregg Erickson (biology), Harold Hunt
3. climate change in EIA (m.e.r)	DVS/IN: Jos Arts, Paul DGMo: Brigide Kisters, Bas Hoogeboom	Pete Conn
4. Sustainable materials & energy	DI: Leendert v Geldermalsen, John Duijsens, Gerwin Schweitzer, Willem Zandvliet	Steve Prey, Harold Hunt, Bill Nokes



1a. Traffic / mobility management

Caltrans	
Experts	Vahid Nowshiravan, Pete Conn
Research	<ul style="list-style-type: none">• traffic man't: ↓ congestion, VMT (not speed control)• switch from VMT⇒VHT (veh.hours trav) (UC Berkeley, results May/June)
Key questions	<ul style="list-style-type: none">• impact of traffic management on GHG (does ↓congestion lead to ↑VMT, GHG?)
Information exchange	



1a. Traffic / mobility management

	Caltrans	V&W/RWS
Experts	Vahid Nowshiravan, Pete Conn	Marko Ludeking, Paul Fortuin
Research	<ul style="list-style-type: none">• traffic man't: ↓ congestion, VMT (not speed control)• switch from VMT⇒VHT (veh.hours trav) (UC Berkeley, results May/June)	<ul style="list-style-type: none">• mob.man't: job-home traffic + business travel; measures+effects• DVM, Dynamax: effect speed on GHG?
Key questions	<ul style="list-style-type: none">• impact of traffic management on GHG (does ↓congestion lead to ↑VMT, GHG?)	
Information exchange		



1b. Mitigation policies

Caltrans	
Experts	CARB: Belinda Chen
Research	<ul style="list-style-type: none">• new vehicle choice & Gov't incentives (UC Berkeley)• prioritizing mitigation technologies by cost-effectiveness (UC Davis)• STEPS program (UCD): transport energy pathways (el, H, bio-f, lo-C f-fuel)
Key questions	<ul style="list-style-type: none">• vehicle tax registration program in NL
Information exchange	



1b. Mitigation policies

	Caltrans	V&W/RWS
Experts	CARB: Belinda Chen	DGMo: Monique van Wortel
Research	<ul style="list-style-type: none">•new vehicle choice & Gov't incentives (UC Berkeley)•prioritizing mitigation technologies by cost-effectiveness (UC Davis)•STEPS program (UCD): transport energy pathways (el, H, bio-f, lo-C f-fuel)	<ul style="list-style-type: none">•ABvM•collaboration DGMo-FHWA's on road pricing
Key questions	<ul style="list-style-type: none">•vehicle tax registration program in NL	
Information exchange		<p>previous: <ul style="list-style-type: none">•information ABvM -> CARB<p>future: <ul style="list-style-type: none">•DGMo collab with FHWA's -> CARB/CT</p></p>



2. Design parameters – upper/base structure

Caltrans	
Experts	Glenn deCLou (drainage), Keith Jones + Karl Dreher (stormwater), Gregg Erickson (biology), Harold Hunt
Research	<p>current:</p> <ul style="list-style-type: none">• warm-mix asphalt (WMA)• ↓ rolling resistance (-5% CO₂) (MIRIAM project!)• use of fly-ash & slag in concrete: ↑ strength, ↓ CO₂ (~ 50%!) <p>intended:</p> <ul style="list-style-type: none">• effects of flooding/sea-level↑ on: drainage/base structure design



2. Design parameters – upper/base structure

	Caltrans	V&W/RWS
Experts	Glenn deCLou (drainage), Keith Jones + Karl Dreher (stormwater), Gregg Erickson (biology), Harold Hunt	Jan van der Zwan, Henkjan Beukema
Research	<p>current:</p> <ul style="list-style-type: none">• warm-mix asphalt (WMA)• ↓ rolling resistance (-5% CO2) (MIRIAM project!)• use of fly-ash & slag in concrete: ↑ strength, ↓ CO2 (~ 50%!) <p>intended:</p> <ul style="list-style-type: none">• effects of flooding/sea-level↑ on: drainage/base structure design	<p>intended:</p> <ul style="list-style-type: none">• effect changing gr. waterlevel on bearing capacity road, shoulder• high water levels vs materials in base (EPS, waste-materials)• effect high T on design param's / present network <p>start-up:</p> <ul style="list-style-type: none">• light-colour asphalt vs energy in tunnels, safety <p>almost finish:</p> <ul style="list-style-type: none">• sustainable construction/materials (Dubocalc)



2. Design parameters – upper/base structure

	Caltrans	V&W/RWS
Experts	Glenn deCLou (drainage), Keith J + Karl D (stormwater), Gregg Erickson (biology), Harold Hunt	Jan van der Zwan, Henkjan Beukema
Key questions	<ul style="list-style-type: none">• participate in MIRIAM• how arrive at factor 1.6-1.7?• what is probability of most severe scen?	<ul style="list-style-type: none">• update design rain storm (based on KNMI scen's): factor 1.6-1.7 for 1x/10yr storm.<ul style="list-style-type: none">- safety factor used by CT for CC?- return period used for max events (i.e inundated road): 5, 10 or 15 years?
Information exchange		



3. Climate change in EIA (m.e.r)

Caltrans	
Experts	Pete Conn
Information (exchange)	<ul style="list-style-type: none">•EIA template•manual EMFAC2007 model
Research	Mitigation: <ul style="list-style-type: none">•prioritization projects on basis of potential GHG em's (UC Davis) (method contract vs. operational)



3. Climate change in EIA (m.e.r)

	Caltrans	V&W/RWS
Experts	Pete Conn	DVS: Jos Arts, Paul Fortuin DGMo: Brigide Kisters, Bas Hoogeboom
Information (exchange)	<ul style="list-style-type: none">•EIA template•manual EMFAC2007 model	No CC in mer (statement Eurlings): <ul style="list-style-type: none">•climate test: already in new Tracé wet•investment fund: sort under Delta Law•studies OK! Build as climate-robust / -neutral as possible Possible CC in mer: <ul style="list-style-type: none">•VROM klimaatwijzer (CC in RO va 2015)•article mer-commission
Research	Mitigation: <ul style="list-style-type: none">•prioritization projects on basis of potential GHG em's (UC Davis) (method contract vs. operational)	<ul style="list-style-type: none">•develop manual (handreiking) CC - dry infra•climate pilot in project (verkenningsfase)



3. Climate change in EIA (m.e.r)

	Caltrans	V&W/RWS
Experts	Pete Conn	DVS: Jos Arts, Paul Fortuin DGMo: Brigide Kisters, Bas Hoogeboom
Key questions	<ul style="list-style-type: none">•which tools used to evaluate GHG consequences (C-footprint)•is C-sequestration used to offset C-em's; how is offset determined?	



3. Climate change in EIA (m.e.r)

EIA in California:

- based on template, colour coded

Black text = required headings

Blue text = instructions and guidance to be considered
and deleted from the final document

Red text = boilerplate text to be inserted into document, as appropriate

Purple text = sample text that can be used in document, as appropriate

Orange text = text needing special attention; for example, to distinguish between
instructions relating to draft and final environmental document

- Guidance on mitigation:
 - The five categories of mitigation are avoid, minimize, rectify, reduce or eliminate, and compensate.
 - mitigation proposed for project must have:
nexus: connection between impact and mitigation measure
rough proportionality: between project impact & amount of mitigation



3. Climate change in EIA (m.e.r)

EIA in California...

- Mitigation procedure:
project "cumulatively significant/insignificant" impact on CO2?

-> insignificant: pavement rehab, shoulder widening, culvert/drainage

-> significant: congestion↓, capacity↑

-> qualitative analysis:

- discuss impact on congestion↓, VTD↓

- " early planning (modal choice, alternatives)

-> quantitative analysis:

- with EMFAC2007 model: calc. build vs. no-build
(for existing yr & design yr)

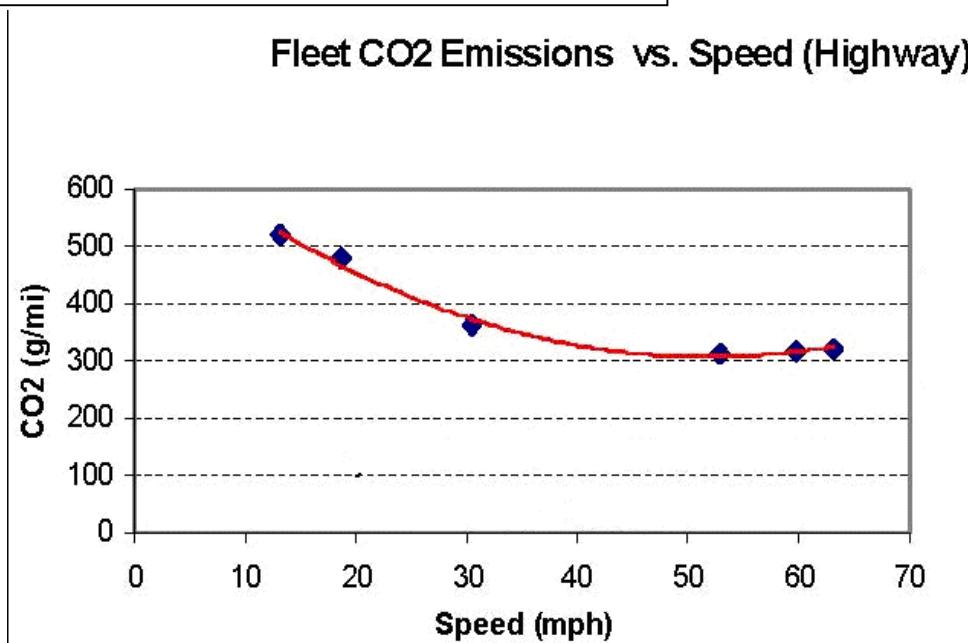
- calculate CO2 em's for the alternatives in early planning
(on-site em's vs. operational em's)



3. Climate change in EIA (m.e.r)

Model EMFAC (2007)

- calc's em (CO₂, CO, NOx, PM, fuel, Pb)
- based on inventory (1965->2007)
- vehicle fleet in 13 categories
- prognoses: input yr-file





3. Climate change in EIA (m.e.r)

EIA in California...

- Adaptation
 - > adaptive analysis needed, unless:
 - programmed for construction before 2014
 - routine maintenance
 - > adaptive analysis
 - discuss anticipated regional effects of CC
(following Adaptation report (2009) + scenarios)
 - discuss anticipated (additional) maintenance costs
 - discuss ITS elements: how respond to flood, fire, road-closure
 - > vulnerable areas for sea-level rise:
 - reference doc: Nat.Acc.Sci report on sea-level rise (Dec 2010)
(DoT awaits planning scen's -> review design standards)
 - determine impact (2050 and 2100 sea-level scenarios)



4. Sustainability in materials/energy

Caltrans	
Experts	Steve Prey, Harold Hunt, Bill Nokes
Research	-
Key questions	<ul style="list-style-type: none">•how determine CO2-footprint?
Information exchange	



4. Sustainability in materials/energy

	Caltrans	V&W/RWS
Experts	Steve Prey, Harold Hunt, Bill Nokes	Leendert van Geldermalsen, John Duijsens, Gerwin Schweizer, Willem Zandvliet
Research	-	3 corporate projects: - Sustainable Facilities - Sure & Sustainable - Sustainable Procurement (Dubocalc)
Key questions	•how determine CO2-footprint?	
Information exchange		



Guideline framework, Rijkswaterstaat..

Program: "Rijkswaterstaat Sustainable"

-> goal: RWS (+ RWS objects) 100% sustainable

-> 3 corporate projects started:

- Sustainable Facilities
- Sure & Sustainable
- Sustainable Procurement

-> project "Sustainable Facilities"

goals:

- 2% energy reduction each year
- 100% sustainable energy production in 2020
- 100% " procurement facilities in 2010
- mobility: stimulate public transport





Guideline framework, Rijkswaterstaat..

->Project "Sure & sustainable"

goals:

- reduce road infrastructure energy use (20% in 2010, 80% in 2017)
- make energy sustainable (CO₂ free)
- guarantee use of road infra during calamities (management)

types of measures:

- daily (lights out, etc.)
- adapt systems (f.e lights out automatically)
- use of sustainable/frugal materials (f.e leds)
- implement CO₂-free energy (solar power, heat from roads, windmills,...)

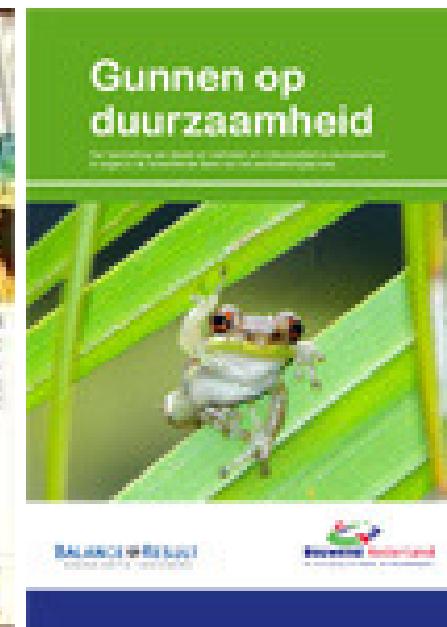
-> implement in 3 phases (up to 2017)





Guideline framework, Rijkswaterstaat..

- > Project "Sustainable Procurement"
develop criteria for sustainable procurement
- > computer program "Dubocalc" (environmental cost indicator)
 - based on LCA, calculates environmental effects of materials -> EMVI





Synergy points

V&W/RWS	
1a. Traffic/mob. Management	<ul style="list-style-type: none">• interest in VDT study?
1b. Mitigation policies	<ul style="list-style-type: none">• new vehicle choice & Gov't incentives?• prioritizing mitigation technologies by cost-effectiveness?• STEPS program?
2. Design parameters <ul style="list-style-type: none">- climate change (superstructure)- flooding (substructure)	<ul style="list-style-type: none">• warm-mix asphalt?• MIRIAM project?• use of fly-ash & slag?



Synergy points

	V&W/RWS	Caltrans
1a. Traffic/mob. Management	<ul style="list-style-type: none">•interest in VDT study?	<ul style="list-style-type: none">•interest in mob.man't study?• " in Dynamax/DVM
1b. Mitigation policies	<ul style="list-style-type: none">•new vehicle choise & Gov't incentives?•prioritizing mitigation technologies by cost-effectiveness?•STEPS program?	<ul style="list-style-type: none">•via CARB/FHWA's
2. Design parameters - climate change (superstructure) - flooding (substructure)	<ul style="list-style-type: none">•warm-mix asphalt?•MIRIAM project?•use of fly-ash & slag?	<ul style="list-style-type: none">•gr.waterL - bearing capacity road, shoulder?•hi waterL vs materials in base•hi T - design param's?•light-colour asphalt?•sustainable construction /materials (Dubocalc)?



Synergy points..

V&W/RWS	
3. climate change in EIA (m.e.r)	<ul style="list-style-type: none">•EIA template?•EMFAC2007 model?•potential GHG em's (UCD) construct vs operational?
4. Sustainable materials & energy	<ul style="list-style-type: none">•how determine CO2-footprint?



Synergy points..

	V&W/RWS	Caltrans
3. climate change in EIA (m.e.r)	<ul style="list-style-type: none">•EIA template?•EMFAC2007 model?•potential GHG em's (UCD) construct vs operational?	<ul style="list-style-type: none">•develop manual CC - road•climate pilot in project
4. Sustainable materials & energy	<ul style="list-style-type: none">•how determine CO2-footprint?	<ul style="list-style-type: none">•sustainable materials/energy (Sure & Sustainable,Dubocalc)•how determine CO2-footprint?